

Bird Collisions and Bird-friendly Glass

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Bird collisions with glass windows and walls are almost always fatal. The seriousness of this problem has increased dramatically in recent decades as the use of glass façades and supersize windows has grown significantly with technical improvements in manufacturing. Smithsonian researchers estimated in 2014 that between 350 million and 1 billion birds are killed or mortally wounded by collisions with windows every year. With additional data, better understanding of the dynamics of bird collisions, and even more glass surfaces in urban settings, the American Bird Conservancy now believes that the 1 billion figure is an accurate estimate. <https://abcbirds.org/solutions/preventing-collisions/>

The photo below shows the results of close monitoring that was conducted at a glass building in Chicago during the 2023 spring migration. Over 1000 birds died from collisions in a single night during that research project. It was reported nationally, including the NYT, Washington Post, Chicago Tribune and the UK's Guardian.

At least 1,000 birds died from colliding with one Chicago building in one day



Bird collisions are caused by both reflectivity of glass and transparency of glass. Most birds have very limited binocular vision straight forward because their eyes are on the side of the head for greater lateral vision. They also do not understand glass. If what they see on the other side of glass, or in a reflection, is what they expect to see around

them, they can easily interpret the space as physically accessible to them. The most dangerous situations for most birds are:

- glass reflection of vegetation—including on elevated terraces;
- glass transparency where vegetation is indoors; and,
- glass corners and passageways that present a “see-through” visual effect for birds, including glass railings that surround balconies and terraces.

Not all birds are affected the same way or to the same degree. Some species are highly vulnerable to window strikes due to their feeding habitats. All birds—as part of their evolution and ability to fly—have highly porous bones that are susceptible to breaking upon impact. Nearly all birds die from impact trauma, or from being injured and vulnerable to predators, or incapable of accessing food.

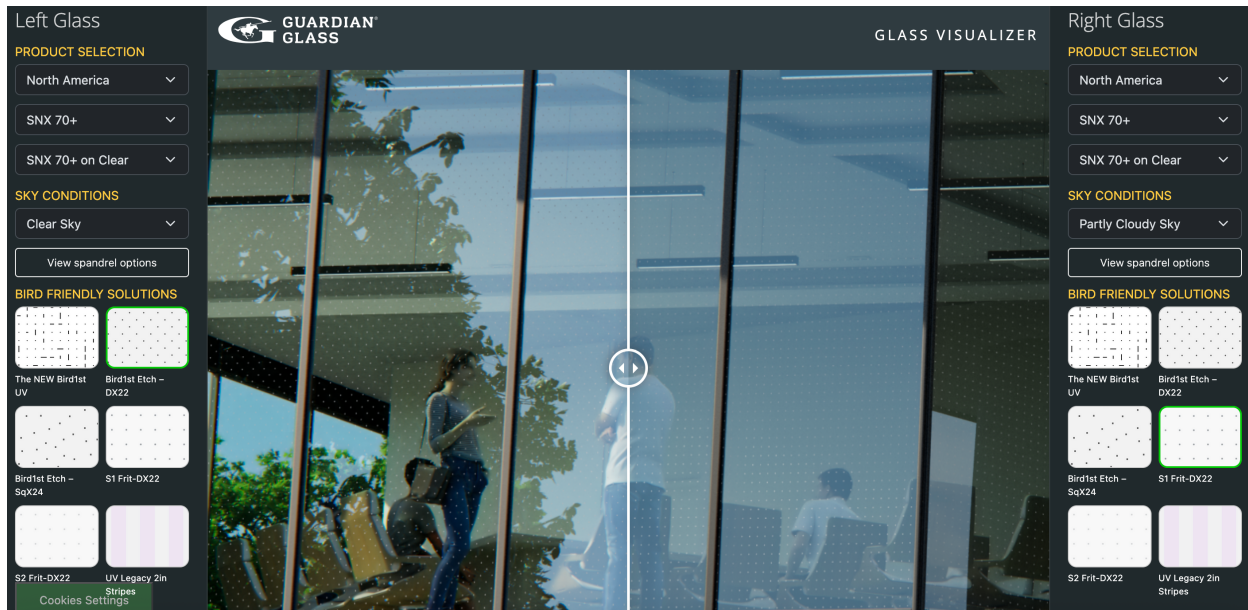
There are many ways to help birds perceive and avoid colliding with glass in built structures. Here are a few key points about bird-friendly glass from the American Bird Conservancy and from three glass manufacturers—Walker, Vitro, and Guardian:

- B-fG treatments are generally visible to humans, but many types are subtle and are not consciously noticed much of time.
- Most B-fG features can be combined with energy efficient features in dual panel configurations.
- Etched patterns into the glass surface can be done with lasers or acid, and are typically on surface 1, which is the outer side of the outermost glass panel. Laser and acid etched patterns are mostly small dots or narrow lines, but other options are possible. They work very well and have durability.
- Ultraviolet (UV) coating treatments are generally not visible to humans, but are perceived as a barrier by most songbirds. However, raptors, jays, hummingbirds, doves, pigeons, and most waterfowl do not see UV either, so it is not an effective deterrent for them. And UV patterns can be visible to humans when wet or dirty.
- Fritting is ceramic material applied in patterns on the glass surface, usually surface 2, the inside of the outer pane. Fritting works well in terms of bird-strike efficacy, but it can be a little more visible to humans than etching.
- Glass treatments are generally done by the manufacturer and sent to fabricators, where the panes are cut and assembled into the window sections required. The completed panes are then sent to an installer for use at the construction site.
- The American Bird Conservancy tests glass products in a tunnel, using actual glass product supplied by manufacturers. The ratings provided from these tests are expressed as the Threat Factor (TF), from 0-100. A rating of 30 means that the product will reduce the chance of a bird strike by about 50%. TF levels of 15-25 are common with most of difference being related to the spacing and/or pattern of the dots or lines, and their size and color, which provide much better than 50% deterrence.
- Glass reflectivity is a factor as well. ABC will not test glass with a surface reflectivity of over 15%. High reflectivity as a design feature generally exacerbates the bird collision problem by making deterrent features more difficult to perceive.

A TF level of 30 is the standard for the Arlington GBIP, both in the 2020 iteration and also in the new version, effective March 31, 2026. The 2020 GBIP required B-f glass from 8-36 feet. The 2026 version requires B-f glass from the ground to 50', which is

much more effective, covering both the shrub and understory layer as well as most canopy heights. Other cities have ground to 75 or ground to 100 (NYC and DC, for example).

Below is a screenshot of the glass visualizer tool on the Guardian Glass website. It allows viewers to select glass type and bird-friendly treatments, and see the windows in different light conditions.



The photos below—all taken in Arlington within the past 10 years—include the top species identified by the ABC and other expert sources as most vulnerable to window strikes. Some are year-round local residents. Some migrate here in the spring and breed in the area. Some live here in the winter months, and migrate north for breeding. Most of these photos were included in a series that was presented to the Arlington County Board in 2021 as public comment in a development project hearing.

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| 1. House Finch | 11. White-throated Sparrow |
| 2. Black-and-white Warbler | 12. Grey Catbird |
| 3. Black-throated Blue Warbler | 13. Blackpoll Warbler |
| 4. Ovenbird | 14. American Goldfinch |
| 5. Slate-colored Junco | 15. American Robin |
| 6. Mourning Dove | 16. Common Yellowthroat |
| 7. Hermit Thrush | 17. Ruby-throated Hummingbird |
| 8. White-breasted Nuthatch | |
| 9. Yellow Warbler | |
| 10. Cedar Waxwing | |

